REMARKS

Claims 10-29 are pending. Presently, all claims stand rejected over the prior art cited by the Examiner. In particular, claims 10 and 18-20 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,832,992 to Van Andel ("Van Andel"). Independent claim 27 stands rejected under 35 U.S.C. § 103(a) for obviousness over Van Andel in view of U.S. Patent Application Publication No. 2003/0159802 to Steneby et al. ("Steneby"). Claims 11-13 and 21-23 stand rejected under 35 U.S.C. § 103(a) as being obvious over Van Andel in view of U.S. Patent Application Publication No. 2002/0153133 to Haglid ("Haglid"). Claims 14-17 and 24-26 stand rejected under 35 U.S.C. § 103(a) for obviousness over Van Andel in view of U.S. Patent No. 4,428,197 to Liljequist ("Liljequist"). Claim 27 stands rejected under 35 U.S.C. § 103(a) for obviousness over Van Andel in view of Steneby. Claims 28 and 29 stand rejected under 35 U.S.C. § 103(a) for obviousness over Van Andel in view of Haglid or Liljequist, respectively, in further view of Steneby.

Independent claims 10, 20, and 27 have been amended to clarify certain aspects of the present invention. Support for these amendments may be found, for example, in original claim 2. Claims 11-13, 21-23, and 28 are canceled. Dependent claims 14, 24, and 29 have been rewritten in independent form to include all the limitations of their respective base claims.

I. <u>Independent Claims 10, 20, and 27</u>:

Independent claims 10, 20, and 27 have been amended to recite, *inter alia*, that the present invention includes "at least four temperature sensors arranged in the outlets and inlets of the first and second channels." These "at least four temperature sensors" are included so that the temperature differences may be measured across the inlets and outlets of the respective channels. *See* page 7, lines 3-14 of the present application. As set forth in amended claims 10, 20, and 27, these sensors are "arranged in the outlets and inlets of the first and second channels." Without at least four sensors in such an arrangement (i.e., one at both the inlet and outlet of each channel), the temperature differences between the inlets and outlets of both channels could not be measured. In accordance with the present invention, heat transfer efficiency may be maximized by controlling the flow through the channels (e.g., via ventilators 8 and 12) such that

the first and second temperature differences are "approximately equal," as measured by the "at least four temperature sensors." *See* page 7, lines 3-14. Applicants respectfully submit that none of the cited references teach or suggest the present invention as set forth in amended claims 10, 20, and 27.

Van Andel discloses no temperature sensors arranged as set forth in claims 10, 20, and 27. Steneby likewise includes no disclosure of the claimed "at least four temperature sensors." Thus, even if Steneby were combined with Van Andel, such a combination fails to satisfy each and every element of claims 10, 20, and 27.

Regarding Haglid, the Examiner has taken the position that "Haglid clearly shows a first channel outlet temperature sensor (ref 84), a second channel inlet temperature sensor (ref 86), and a third temperature sensor (ref 88). It would have been obvious to add another temperature sensor at the outlet since this is well known in the art. By having more than one temperature sensor, Haglid is capable of determining temperature differences in the ventilator channels by inputting the signals from the multiple temperature sensors into the controller."

As the Examiner points out, Haglid includes three temperature sensors, in contrast with the presently claimed "at least four temperature sensors." The temperature sensors in Haglid are also not "arranged in the <u>outlets</u> and inlets of the first and second channels," as is positively recited in claims 10, 20, and 27. Haglid only teaches the two channel sensors (84, 86) at the <u>inlets</u> of the respective channels. Haglid, at ¶ [0034] and Fig. 1. The third sensor (88) in Haglid is located inside the heat exchanger, and not at the inlet or outlet of either channel. Haglid, at Fig. 1 and ¶¶ [0063]-[0064] (explaining that the sensor 88 detects freezing and ice accumulation inside the heat exchanger). Haglid's three (not four) temperature sensors do not satisfy the presently claimed arrangement. It is not true, as the Examiner suggests, that "Haglid is capable of determining temperature differences in the ventilator channels by inputting signals from the multiple temperature sensors into the controller." Because Haglid has no sensors whatsoever at the outlets of the respective channels, Haglid cannot measure the temperature differences "between the inlet and outlet" of either channel, as is set forth in claims 10, 20, and 27. Because Van Andel and Steneby do not teach the claimed "at least four temperature sensors," even if combined with Van Andel and/or Steneby, Haglid does not teach or suggest the

claimed arrangement of claims 10, 20, and 27.

Further, the Examiner has not demonstrated that "[i]t would have been obvious to add another temperature sensor at the outlet." The Examiner cites no reason that one would do so. Even if it were obvious to add "another temperature sensor at the outlet" (which Applicants do not concede), it would require at least two temperature sensors, one at each outlet, to satisfy the elements of claims 10, 20, and 27. Even then, one would need to also add the claimed "controller for comparing the readings of the temperature sensors and for controlling the ventilators in the first and second channels, such that the temperature difference between the inlet and outlet of the first channel is approximately equal to the temperature difference between the inlet and outlet of the second channel," as is positively recited by all of claims 10, 20, and 27. There is absolutely nothing in Haglid to suggest providing a controller to be used in such a particular manner. Haglid includes no teaching whatsoever of measuring temperature differences across the respective channels, and using such temperature measurements to balance the airflow and maximize heat transfer efficiency.

Further, the device in Haglid cannot have the presently claimed balanced air flows with use of four temperature sensors because it does not use a fine wire heat exchanger. Haglid expressly prefers the use of a welded plastic hollow plate heat exchanger, not a fine wire heat exchanger. Haglid, at ¶ [0083]. In such heat exchangers as in Haglid, condensation occurs and therefore heat is released. *See, e.g.,* Haglid, at ¶¶ [0061],[0076],[0086]. Because of the heat release, the air flows are not equal when the temperatures are equal. By contrast, in accordance with the present invention set forth in claims 10, 20, and 27, a "fine wire heat" exchanger is used, wherein heat transfer can occur within, for example, 50ms for a 0.3m/s flow. Because of such high speed of the heat transfer, no condensation occurs, such that when the temperatures are equal, the flows are also equal. Thus, the claimed balancing of air flows with use of temperature measurements is only possible when a fine wire heat exchanger, as claimed, is used.

For the foregoing reasons, claims 10, 20, and 27 are patentable over Van Andel, Steneby, and Haglid. Claims 18 and 19, which depend from claim 10, are patentable for at least the same reasons.

II. Independent Claims 14, 24, and 29:

The present invention, as set forth in currently amended claims 14, 24, and 29, includes "a means for balancing respective flows of air through the first and second channels." To that end, a double-acting cylinder and piston arrangement is utilized having "an inlet and an outlet and a means for controlling fluid communication between" the inlet, outlet, and interior chambers of the cylinder and piston system. It is this claimed arrangement that moves air from inside a room to the outside, and vice versa, through the heat exchanger. *See* Figs. 3A and 3B, and page 7, line 15 – page 8, line 12 of the present application (showing and describing the claimed double piston system as including inlets and outlets for movement of inside air AI and outside air AO). Applicants respectfully submit that none of the cited references teach or suggest the present invention as set forth in amended claims 14, 24, and 29.

Liljequist is generally directed to a Stirling engine having double acting pistons. Based on the disclosure of Liljequist, the Examiner has taken the position that "it would have been obvious to one of ordinary skill in the art at the time of invention to include an air piston balancing means to Van Andel's heat exchanger because it allows for optimal energy efficiency when it comes to exchanging heat from the outside air to the indoor air. It also would balance the air pressure, thus making the system stable and reliable." Office Action, at page 7, 10-11. Applicants respectfully disagree.

It is well known that Stirling engines are generally intended to convert heat energy into mechanical work, and that the fluids being circulated by the pistons in a Stirling engine remain contained within the engine. *See, e.g.,* Liljequist, at Fig. 9 (showing no inlet or outlet for the fluid contained within the engine) and col. 19, lines 9-19 (explaining that it is desirable to "contain" working-gases in the "hermetically sealed crankshaft enclosure"). In other words, the Stirling engine generally moves heat, but not fluid such as air, into and out of it. The Stirling engine in Liljequist would therefore not work "for balancing respective flows of air," as is set forth in claims 14, 24, and 29, because any air used as a "working-gas" would remain contained within the engine. By contrast, the presently claimed balancing means positively

includes "an inlet and an outlet" for inside and outside air, and provides for fluid communication between the inlet, outlet, and certain piston chambers of the balancing means to move air from the inside of a room to the outside. *See* Figs. 3A and 3B, and page 7, line 15 – page 8, line 12. Liljequist contains no teaching or suggestion of the claimed "inlet" and "outlet" of the presently claimed double piston means for balancing air flows. Simply combining the heat exchanger of Van Andel with the Stirling engine of Liljequist would not suffice to actually move the air from the inside of a room to the outside, and vice versa, through a heat exchanger. Further, adding a gas inlet and outlet to the piston chambers in Liljequist would render it inoperable for its intended use, suggesting that there would be no motivation to modify Liljequist in such a manner. *See* MPEP 2143.01.

Van Andel merely discloses a rotor (47) which draws air from two feeds (21', 23') into separate chambers divided by a wall (49) within the housing (45). Heat conducting wires running between the two chambers allow for heat transfer between the air in the two chambers while the rotor (47) rotates and pushes the heat-exchanged air through outlets (22', 24'). *See* Van Andel, at col. 8, lines 5-27. Steneby merely discloses a ventilation device installed in a wall, and having fans (18, 20) which can be controlled so as to make the total airflow substantially equal in both directions through the ventilator. Steneby, at Abstract and ¶ [0063]; Fig. 1. Nothing in Van Andel or Steneby teaches or suggests using the presently claimed double piston means for balancing air flows. Van Andel's and Steneby's teachings therefore cannot be combined with the teachings of Liljequist to overcome the deficiencies discussed above.

For the foregoing reasons, independent claims 14, 24, and 29 are patentable over the cited references. Claims 15-17 and 25-26, which depend from claims 14 and 24, are likewise patentable for at least the same reasons.

CONCLUSION

For the foregoing reasons, Applicants respectfully request that the rejections to the claims be withdrawn, and that pending claims 10, 14-20, 24-27, and 29 be allowed.

Respectfully submitted,

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